MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

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A. A. COMMON, LL.D., F.R.S., President, in the Chair.

William Anderson, Ballee House, Ballymena, co. Antrim, Ireland;
Thomas Frederick Furber, Trigonometrical Survey of New South Wales, Department of Lands, Sydney, Australia;
Frank L. Grant, M.A., 58 Kelvingrove Street, Glasgow;
Edward Ayearst Reeves, 24 Clyde Road, Wallington, Surrey;
George Frederick Herbert Smith, B.A., New College, Oxford; and
T. M. Teed, C.E., F.R.G.S., 188 Camberwell Grove, Denmark Hill, S.E.,

were balloted for and duly elected Fellows of the Society.

The following candidates were proposed for election as Fellows of the Society, the names of the proposers from personal knowledge being appended :—

Rev. Frederick Lisle Bullen, Littleton Rectory, Thornbury, Gloucestershire (proposed by W. F. Denning); and
Ernest W. Ellerbeck, Borough Meteorologist &c., Scarborough, Yorkshire (proposed by W. E. Plummer).

Sixty presents were announced as having been received since the last meeting, including amongst others :—

Rev. S. J. Johnson, "Historical and Future Eclipses," presented by the author; album containing a collection of autograph letters &c., from Sir G. B. Airy, Dr. J. R. Hind, Mr. J. W. Bosanquet, &c., relating to ancient eclipses, presented by Mr. Maw.

Note on Mr. Stone's Paper, "Expressions for the Elliptic Coordinates of a Moving Point to the Seventh Order of Small Quantities." By Professor Ernest W. Brown.

In the January number of the *Monthly Notices* Mr. Stone gives the expressions for the polar coordinates of a point moving in an ellipse about one focus, as far as quantities of the seventh order inclusive, with respect to the eccentricity and inclination. It may perhaps be useful to mention that these expressions are substantially contained in a memoir by Cayley, "Tables of the Developments of Functions in the Theory of Elliptic Motion" (*Memoirs R.A.S.* vol. xxix. 1861, pp. 191–306; *Coll. Works*, vol. iii. pp. 360–474). It is true that the expressions there given refer only to the case of motion in the plane of reference, but the steps necessary to obtain the longitude and latitude when the ellipse is inclined to the plane of reference require little more than the reading off of the coefficients from the tables.

The expressions for positive and negative powers of r/a are given on pp. 425–427 (*Coll. Works*), and that for the orbital elliptic longitude on p. 474.

To obtain the longitude in the plane of reference, we have, in Delaunay's notation,

$$\tan (V-h) = \cos i \tan \nu;$$

whence

$$V-h=\nu-\tan^2\frac{1}{2}i\sin 2\nu+\frac{1}{2}\tan^4\frac{1}{2}i\sin 4\nu-\frac{1}{3}\tan^6\frac{1}{2}i\sin 6\nu+\ \ldots$$

or

$$V=h+\nu-(\gamma^2+\gamma^4+\gamma^6)\sin 2\nu+\left(\frac{1}{2}\gamma^4+\gamma^6\right)\sin 4\nu-\frac{1}{3}\gamma^6\sin 6\nu+\ \ldots \quad (1)$$

Put

$$\nu=g+f,$$

where f is the true anomaly, and let

$$\cos jf=\Sigma_i A_i \cos il, \qquad \sin jf=\Sigma_i B_i \sin il,$$

where i, j are positive integers. We obtain

$$\sin j\nu=\frac{1}{2}\Sigma_i (A_i+B_i)\sin (jg+il)+\frac{1}{2}\Sigma_i (A_i-B_i)\sin (jg-il).$$

The coefficients

$$\frac{1}{2}(A_i+B_i), \qquad \frac{1}{2}(A_i-B_i)$$

are tabulated by Cayley * for all values of i, j from 1 to 7, as far as the order e^7 inclusive; so that the coefficient of any term in

* His notation differs from that used above.